

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

INDEXED

1914

LIBRARY
RECEIVED

★ JUL 9 1920 ★

U. S. Department of Agriculture

— THE —
CHILDHOOD OF FRUIT TREES

BEING A HISTORY OF THEIR PROPAGATION AND DEVELOPMENT IN THE NURSERY, FROM THE PLANTING OF THE SEED, THROUGH THE VARIOUS OPERATIONS OF BUDDING, GRAFTING, SPROUTING, ETC., UNTIL THE TREES ARE READY TO TRANSPLANT AND BEGIN THEIR NEW CYCLE OF LIFE, AMID NEW SURROUNDINGS, IN THE ORCHARDS OF FRUIT GROWERS : :

PUBLISHED BY

GREENING'S BIG NURSERIES

1,500 ACRES

Monroe, Michigan

**SECOND
EDITION**

**REVISED
ENLARGED**



— THE —

CHILDHOOD OF FRUIT TREES

BEING A HISTORY OF THEIR PROPAGATION AND DEVELOPMENT IN THE NURSERY, FROM THE PLANTING OF THE SEED, THROUGH THE VARIOUS OPERATIONS OF BUDDING, GRAFTING, SPROUTING, ETC., UNTIL THE TREES ARE READY TO TRANSPLANT AND BEGIN THEIR NEW CYCLE OF LIFE, AMID NEW SURROUNDINGS, IN THE ORCHARDS OF FRUIT GROWERS : :



PUBLISHED BY

GREENING'S BIG NURSERIES

1,500 ACRES

Monroe, Michigan

SECOND
EDITION

REVISED
ENLARGED

ENTERED ACCORDING TO ACT OF CONGRESS IN THE YEAR
NINETEEN HUNDRED AND TWELVE
BY THE GREENING NURSERY COMPANY
IN THE OFFICE OF THE LIBRARIAN OF CONGRESS
AT WASHINGTON, D. C.




ALL RIGHTS RESERVED
INCLUDING THAT OF TRANSLATION INTO
FOREIGN LANGUAGES
NOT EXCEPTING THE SCANDINAVIAN



BENJAMIN J. GREENING

Vice-president and General Manager

WHICH ?

 WHICH was created first, the hen or the egg ? Thousands of theologians and millions of good people are still adding their brains debating this old metaphysical absurdity.

The other day a gentleman in a frock coat and chin whiskers revived the old, old question by asking us “which was made first, the seed that produced the tree or the tree that produced the seed.”

We scratched our head a minute and then told him—that we did not know.

We don’t know yet.

We don’t expect to know until taught in the schools of the New Jerusalem.


But one thing we do know is,—

Well, read this booklet through and you, also, shall know.

Greening’s BIG Nurseries

MONROE, MICHIGAN

Natural Processes

 HERE is no myth, magic, nor miracle about the propagation of fruit trees. They are produced by purely natural processes; and yet these natural processes are so very mysterious that many people regard the nurseryman as a worker of wonders. Some suppose he is endowed with supernatural powers. Others there be who aver that he is in league with the eloquent gentlemen who flirted with our mother Eve. All these guesses and opinions show that there is a natural desire on the part of the public to know just how fruit trees are produced, and how each is made to "bear fruit after its kind." And so to satisfy the curiosity of some, to give instruction to others and to make all men and women better acquainted with the nature of trees these pages are written : : : : :

Why Improved Varieties Do Not Come True to Type from Seed



IF all fruit trees grew true to type from seed there would be no need of nurseries. A young man desiring to start a peach orchard, for instance, could be his own nurseryman. All he would have to do would be to go to a picnic with his best girl, eat a hundred peaches and save the pits. The next day he could plant them on her father's lot and lo! and behold, he would have a hundred peach trees, besides the original peach who went to picnic with him.

But Nature does not work in this way.

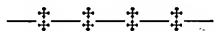
Nature works by rule; that is to say she works by law. And it has been found by experience that any interference with the law always interferes with the profits!

The law is that all wild, "natural" fruits reproduce themselves faithfully to their kind; but the choice "tame" fruits have been produced largely by cross-breeding and hybridizing; and the tendency of the cross-bred plant or animal is to revert to the original type, whilst the hybrid is always sterile.

Nature has put the seal of impotence on the hybrid.

The Missouri mule is a well known illustration of this physical law.

It was this fact that John J. Ingalls had in mind when he said of a certain political party that, "It reminds me of our patient, plodding beast of burden; it is without pride of ancestry nor hope of posterity." Ingalls raised a laugh until some vulgar man pointed out the fact that they raise mules in Missouri in the same way that we raise houses in the East! Then everybody was solemn!

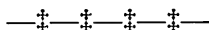


Any variation from the normal reduces fecundity. Either extreme destroys it; and thus do we prove the German philosophy, "that all nature moves in circles, and things that are opposite are the same." The highly developed—or perhaps we should say the overdeveloped—are not fecund.

Washington had no offspring. Well has it been said that nature deprived him of children, that the whole nation might call him father.

All great men are of obscure parentage and few of their children become great. "A great man is like a mountain with the valley of ancestry on one side and the depression of posterity on the other."

Unfortunately we cannot bud or graft great men, and when they die their race becomes extinct. Nature with the flaming sword of death still guards the Tree of Life "lest men become as Gods."



If you plant one hundred Northern Spy seeds you will get one hundred apple trees, all differing from the parent tree, all differing from each other, and all tending to revert to the original pippin that the Lord made on the third day of creation.

The fact, then, that improved fruits do not truly reproduce themselves from seed has led men to devise other ways to perpetuate their kind, and preserve for the human family the benefits of horticultural progress.

THIS FACT GIVES THE NURSERYMAN HIS JOB.

I, George Schaefer, being duly sworn, do hereby certify that I am employed by The Greening Nursery Co., of Monroe, Michigan, and that I have been in charge of a force of assistants gathering scions for said nursery from the best strains of bearing trees, in orchards showing the highest degree of culture. All scions secured have been taken only from such trees as have shown marked superiority as to fruiting power and quality of fruit.

(Signed) GEO. J. SCHAEFER.

COUNTY OF MONROE,

Monroe, Mich., Nov. 1, 1912.


State of Michigan.

Personally appeared before me, a notary public in and for said county, George Schaefer, known to me to be the signer of the above statement, and deposes that his statement is true and correct in all respects.

ROSE FREBES, Notary Public.

My commission expires Sept. 24, 1914.

Roots

N the language of the nurseryman the young plants used for budding and grafting are known as seedlings. They are grown from seed and usually inoculated at the age of two years, with the exception of peach seedlings which grow so rapidly that they are ready to receive the bud the first year.

But inasmuch as the tops are cut away and only the roots are used, the lay reader will understand us better if we refer to them simply as roots.

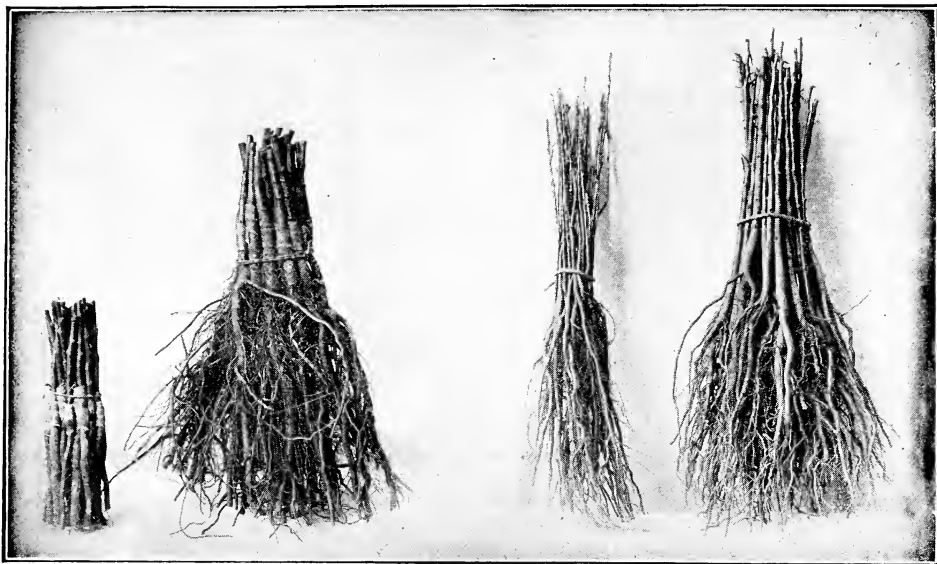
The roots are the foundation of a tree, and it is of the utmost importance that they be strong, healthy and free from any predisposition to disease.

The root system is the provider of food for a tree. It is its business to forage around, sometimes at great depths and always at great distances, to find and supply just the kind of food that the tree needs. In this struggle for existence the roots of one tree are in competition with the roots of other trees, and with every blade of grass, and with every weed that grows in the orchard. It is a battle royal for life; and in this contest under ground, as in the contest among men, the fittest survives.

Few people realize the amount of work done by the roots of a tree. At the end of each little rootlet is a spongeole that exhudes a solvent which prepares the plant food so the tree can use it, very much as the saliva in the mouth prepares the food for human digestion. Besides that these spongeoles have the power of contraction and expansion, so that by this force alone the crude sap is sent to the topmost twigs of a tree. This force is known as root pressure, and the root pressure of a healthy tree will support a column of mercury twenty-six feet high.

Talk of the strenuous life! Why, we men who have air to breathe, and water to drink, and fruit to eat, and sweethearts to darn our socks, why, we live in flowery beds of ease compared to the poor lonely root that lives in the lowly earth and helps prepare for us the food we eat.

The illustrations on the opposite page show the difference between No. 1 and No. 2 seedlings; also the difference between piece-root grafts and whole-root grafts. Greening trees are propagated on No. 1 seedlings only, and they are grafted or budded on whole-roots—one seedling, one tree. Greening trees are the best that can be produced, and yet our vast organization enables us to sell you these trees as cheap or cheaper than you can get piece-root trees elsewhere.



Piece Root
Grafts

French Crab
Whole-root Grafts

No. 2
Seedlings

No. 1
Seedlings

PIECE-ROOT VS. WHOLE-ROOT TREES

Above is shown the piece-root and whole-root graft, also No. 1 and No. 2 fruit tree seedlings. Each one of the bundles contains the same number of grafts and seedlings. The superior value of whole-root trees must be readily apparent, even to the inexperienced; still there are nurserymen who will argue that piece-root and No. 2 seedlings are equal to whole-root and No. 1 seedlings. We use only the strongest whole-root stock and the results are most gratifying. We beg the intending planter to consider the value and trueness of variety of our trees. **We use French Crab-apple roots only.**

There is an axiom in geometry that "the whole is greater than its part." This fact has been accepted as at least the equivalent of gospel truth ever since Mr. Euclid published his little booklet on the subject.

And yet to many people "a tree's a tree" no matter whether propagated on piece-root or whole-root; and the further fact that parent trees differ in productiveness is often ignored by tree planters.

Some people plant trees just for the exercise of digging holes!

SHOWING
HOW
BUDDING IS DONE
AT

Greening's BIG Nurseries

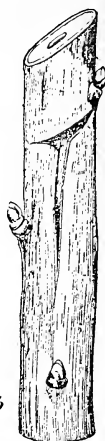


A BUD
STICK



a

MAKING
THE CUT



b

OPENING
THE FLAP



a

INSERTING
THE BUD



WRAPPING
THE BUD



c

CUTTING OFF
THE TOP

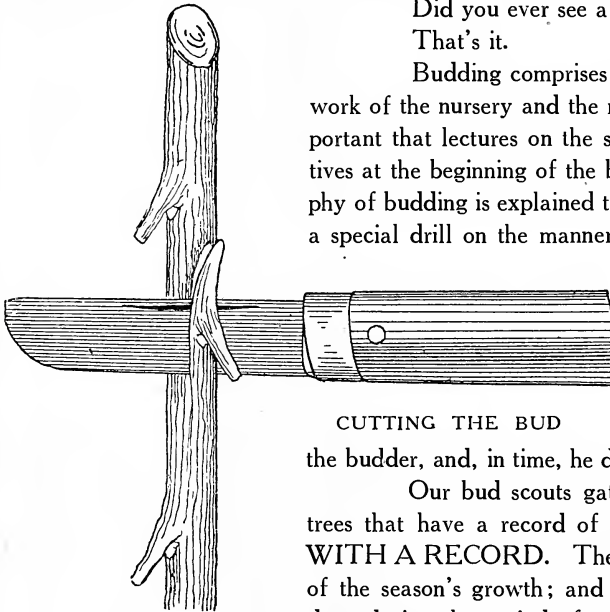
How Budding is Done at Greening's



BUDDING is a very simple operation, and yet it requires great delicacy of touch and precision of movement to perform it successfully; also it requires considerable manual dexterity to become a professional budder. A day's work is about 2,500 buds, and as each bud requires not less than fifteen movements of the hands, a grand total of 37,500 passes are made in the course of ten hours. This is equal to 62 movements per minute.

Did you ever see a Frenchman tell a story?
That's it.

Budding comprises such a large portion of the work of the nursery and the manner of doing it is so important that lectures on the subject are given to the operatives at the beginning of the budding season. The philosophy of budding is explained to them and new men are given a special drill on the manner of holding the knife, cutting the bud, making the matrix, etc.



CUTTING THE BUD

the budder, and, in time, he develops into a budder himself.

Our bud scouts gather the buds from fruiting trees that have a record of good performance—**TREES WITH A RECORD**. The bud sticks are cut from wood of the season's growth; and since the work of budding is done during the period of growth, the bud sticks are prepared so that the petiole or stem of each leaf is left attached to serve as a handle to aid in pushing the bud home when inserting it beneath the bark of the stock. The operation of budding is fully illustrated on the opposite page.

The budding knife illustrated above is made for our use by one of the best cutlery concerns in the country. The best razor steel is used.

Each budder has an assistant to do the wrapping. This wrapper is a sort of understudy to

What Is Budding?



BUDDING is a means of reproduction by division of the parent stock. Suppose we have an Elberta Peach tree of surpassing excellence and we desire another tree exactly like it, the only way to get it is by taking a bud from the tree and attach it to a peach seedling, so that the attached bud, receiving nourishment from the seedling, develops and becomes a tree, bearing fruit precisely like the parent Elberta tree from which the bud was taken.

This operation multiplied 4,000,000 times gives an idea of the scale of propagation at GREENING'S BIG NURSERIES; for we have in truth 4,000,000 budded fruit trees to offer this year. They are of peach, apple, pear, plum and cherry.

The accompanying photo represents a force of budders at work. Each man has an average capacity of 2500 buds per day, and it takes good industrial generalship to get the work accomplished during the limited budding season, which comes during late summer and early autumn.

And yet great as these operations are they represent only one side of the campaign. The other side is found in our army of "bud scouts" scattered throughout the fruit sections of the country, cutting scions from trees known to excel in growing vigor and in productiveness and quality of fruit.

These scouts cover all the leading fruit sections of the United States, enquiring and advertising for fruit trees of unusual merit, and every tree that has a record of good performance is discovered and investigated. If found worthy of a place in GREENING'S BIG NURSERIES the buds are bought and sent in at once by express. Sometimes we have to pay a pretty penny for these buds as the reader can see from the reproduction of a check paid to one party for a small quantity of buds. See page 19.

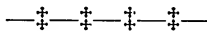
And yet the actual expenditure for buds represents but a fraction of the total outlay of money in this department. The skilled labor, railroad transportation, livery hire, hotel bills, etc., represent an "overhead" expense of many thousand dollars a year.

As a rule our bud scouts have the hearty co-operation of fruit growers, for they realize what we are doing for the advancement of horticulture; and nothing is more encouraging to us than to receive this appreciation. It shows that it pays to be devoted to a principle, for behold "Mine own hath come to me."



OUR GROUP OF CHAMPION BUDDERS

An aggregation of skilled workmen in the art of budding trees. A small army of active people selected from the most reliable, skilled and intelligent help at the nursery. With this force we are able to bud about 60,000 trees per day—about 4,000,000 in the course of the budding season.



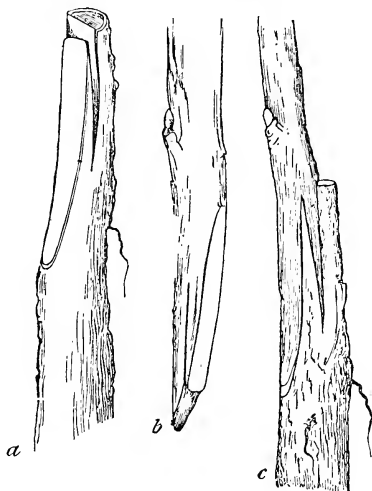
'Tis an art that doth mend nature--aye change it rather, for the art itself is nature.--Shakespeare.

How Grafting Is Done

THIS style of grafting is the one used at Greening's Big Nurseries. It is the form of union that is best adapted for propagating on young seedlings and it has the further advantage that it can be done indoors during the comparative leisure of winter.

The graft is made by cutting off the stock diagonally—one long smooth cut with a sharp knife, leaving about three-fourths of an inch of cut surface as shown by figure *a*. Place the knife about one-third of the distance from the end of the cut surface, and split the stock in the direction of its long axis. Cut the lower end

of the scion in like manner as shown in figure *b*; and when the two parts are forced together, as shown in figure *c*, the cut surfaces will fit neatly together and one will nearly cover the other if scion and stock are of the same size. The union is then wrapped firmly with several turns of waxed cord, after which the grafts are packed away in moist sawdust and kept in our cold storage cellars until spring. It is important that the place of storage should be cool, else the grafts may start into growth and be ruined, or heating and rotting may occur. If the temperature is kept low—not above 40 F.—there will be no growth except callusing and the knitting together of stock and scion. They are packed in large wooden cases, each case holding about 15,000 grafts.



STOCK SCION UNITED

In ordinary propagation by means of whip grafts, the scion is cut with about three buds, and the stock is somewhat longer. The stock is so planted as to bring the union of stock and scion not very far below the surface of the ground.

As the scion and stock are united on the same plane a grafted tree is always straight at the point of union; whereas in a budded tree, the bud being inserted from the side, there is a characteristic crook at that point. If the reader will please bear this distinction in mind he will always be able to tell whether a tree was budded or grafted.

What is Grafting?



RAFTING is another means of multiplying plants by division of the parent stock. It is really the same operation as budding, only performed at a different time and in a different way.

In both cases a piece of the tree which it is desired to propagate is attached to a seedling of its own kind, of strong growing power. It is a form of inoculation; in fact some of the Latin languages use the word "inoculate" to designate the operation.

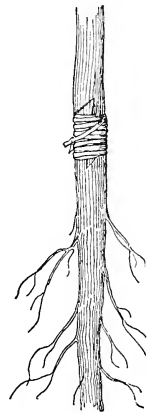
Grafting is done in the winter time, and is practiced chiefly on apple stock. The seedlings are taken up in the fall and the grafting is done indoors, an average operator making about 2,000 grafts a day. A scion about four inches long is attached to a whole root hardy French crab seedling. The point of the union is wrapped with a waxed cord to exclude the air, after which the grafts are carefully packed away in moist sawdust and kept at the proper temperature to form a callus. In the spring they are set out in nursery rows and cultivated until ready for market.

It was formerly the custom to use only pieces of roots to graft on, and many of the small nursery concerns throughout the country still follow this old practice. Thus, instead of attaching one graft to one seedling, the seedling root is cut in three or four pieces and each piece is made to do duty for a graft. But it does not pay to cheat nature in this way. The resultant trees are always weak, and have not the stamina to stand the brunt of the business battle for orchard profits.

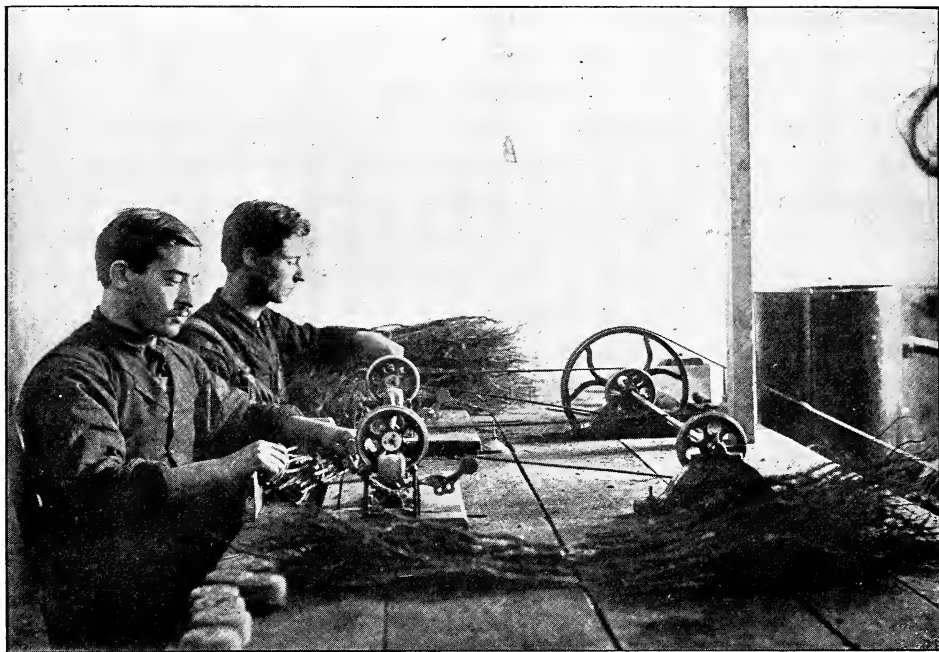
It reminds us of the poultryman who wanted to economize on chicken feed. He began by mixing sawdust with the corn. Day by day he put in more sawdust and less corn until he fed his chickens entirely on sawdust. But when the next brood began to hatch he found that half of them were little woodpeckers that flew away; and those that stayed at home laid wooden eggs!

Too big for nutmegs and not quite big enough for croquet balls !!!

And so, take it altogether, it pays to be honest, even with chickens; and, take it from me, it pays to be honest with trees.



WRAPPED



WRAPPING APPLE GRAFTS BY GASOLINE POWER

Here we show our latest graft wrapping machine, operated by a gasoline engine. Two wrapping machines are shown. One man with machine will wrap over 15,000 whole-root grafts in a single day, more than three times as many as by hand, and the work is far superior to the old method in point of quality, as it insures a better union of the graft. **Note whole-root grafts in picture.**

The accompanying cut shows how grafting is done at Greening's Big Nurseries. Observe that we use whole-root hardy French Crab seedlings exclusively, and that the grafts are wrapped by machinery. At the left of the operator, in the foreground of the picture, will be seen a number of balls of the waxed cord used for wrapping.

About 1,000,000 apple grafts are made in this room every winter.

Pedigree Bred Fruit Trees



REPOTENCY !

You know what that means as applied to live stock.

"Like begets like."

You know that is the law of life.

You would not buy a yellow dog without knowing something of its lineage; and when you buy a bull dog puppy you insist on getting a pedigree a yard long.

The poultry fancier is just as particular. The discoloration or misplacement of a single feather is enough to doom a cockerel to the block.

James J. Hill has revolutionized the live stock industry of the Northwest by the importation and distribution of Hereford bulls and Clydesdale stallions among the farmers who live along the lines of the Great Northern; and today the great empire builder is recognized as an industrial prophet who brought about the fulfillment of his dream.

We know, if we know anything, that all nature is under the domain of the same law. Plant life is susceptible of change and responsive to the same influences.

We may not know why, any more than we know why water is wet and some sermons are dry. After all man does not know much of the nature of things. The great questions of origin and destiny, and the why and the wherefore of immutable law are beyond his ken. The best that we can do is to recognize a fact when we see it.

It is a fact.

Starting with this fact Perry G. Holden, of Iowa, has taught the corn farmers of his state the secret of seed selection; and this process, simple as it is, has added more than \$15,000,000 a year to the wealth of Iowa alone. See recent report of Hon. James Wilson, Secretary of Agriculture.

And starting with the same fact GREENING'S BIG NURSERIES have done a work that will add many millions of dollars to the wealth of fruit growers. GREENING'S trees are TREES WITH A RECORD.

Such trees don't happen by accident.

They require foresight.

They require great faith—faith in a principle—faith in the integrity of nature—faith in the divine law of heredity—faith in humanity—faith in the intelligence and appreciation of the American people.

Everyone
is Familiar with
this
Newspaper
Notice

ay	ATTENTION FRUIT GROWERS.	lot
are	Mr. George Schaefer, bud scout for	28
ter-	GREENING'S BIG NURSERIES , is	ana
com	in this vicinity looking for fruit trees	Cl
on	of unusual merit. His object is to buy	and
.	the buds from these trees for propaga-	abov
o	tion in the Greening Nurseries at	Mon
ip	Monroe, Mich. Mr. Schaefer is not	F
ned	looking for freaks, but anyone having	fus
end	or knowing of any fruit tree that is	w
	above the average in productiveness	Ja
	and quality of fruit, please communi-	acre
	cate with him at the Merchants Hotel.	307

It appears
Frequently in
the
Country
Papers



ONE OF OUR BUD SCOUTS CUTTING SCIONS FROM "TREES WITH A RECORD"
TO PROPAGATE GREENING'S PEDIGREE FRUIT TREES

THE GREENING NURSERY CO.

TREES BY THE MILLION

MONROE, MICH. ~~MAR 27~~ 1912 191 2 No. 18854PAY TO THE ORDER OF Wm. Newman \$210.00Two hundred and ten DOLLARS

To The MONROE STATE SAVINGS BANK

MONROE, MICH.

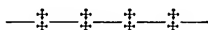
THE GREENING NURSERY CO.

By

ST. S. Greening

SECRETARY

REPRODUCTION OF CHECK GIVEN WM. NEWMAN, PONTIAC, MICH., FOR
A SMALL QUANTITY OF SCIONS



*A booster is a man who does all
the good he can, in all the ways he
can, to all the people he can—and then
leaves the rest to God.*

—Hugh Chalmers.

The Greening Way



THE Greening way recognizes the fact that there are drone trees and productive trees, and that even among the productive trees there is a difference in productivity and quality of fruit; also in vigor of growth.

The Greening way eliminates the drones! Only parent trees with a record of good performance are used for propagation.

Easy is it not?

Yes, our vast organization makes it quite easy, although somewhat expensive. Every man on our sales force is a scout of progress, and reports are constantly coming to our office regarding all the prize-winning trees in the country. Our bud scouts follow up these clews, and if, after investigation, the trees prove worthy according to our standard, arrangements are made with the owner to furnish us scions for propagation.

Oh, yes it is very easy!

All that is needed is the knowledge, the organization, the money, and the willingness to spend the money for the betterment of horticulture.

About a year ago Mr. Chas. E. Greening, President of our company, visited Luther Burbank at his home in Santa Rosa, Cal., and, on this occasion, the great wizard of horticulture highly endorsed our system of up-breeding the quality of fruit trees, commenting upon it as one of the highest ideals in horticultural research ever before attempted. Mr. Burbank emphasized his remarks by stating that our system of breeding pedigreed trees would prove to be worth many millions of dollars to the fruit growers of this country.

Mr. Cressey, horticulturist, in a recent number of the Saturday Evening Post, published an article on pedigree tree propagation from scions taken from actual bearing trees, saying among many other good things in favor of this idea that, "It would pay the fruit growers to pay double the price for pedigreed trees, considering the great benefits we would derive from the trees after they come into bearing, and the greater value such an orchard would have over trees grown in the ordinary way."

But even above the testimony of great men is the testimony of human experience—the testimony of common sense—the testimony of reason—that trees propagated from **TREES WITH A RECORD** are the best.

The Other Way



THE other way of propagating trees is to cut scions (twigs) from young trees in the nursery. The removal of these scions does not lessen the market value of the trees and it is a very cheap process. Thus the saleable trees of one year furnish scions for the next crop of trees, and these for the next, and the next for the next, *ad infinitum*, as the lawyers say.

We know all about it for we did it ourselves for many years. We did our little best like the rest.

We didn't know any better then.

We do now.

And knowing better we produce better trees.

The trouble with the old way is that when trees are grown for many generations from young trees that have never borne any fruit, the fruiting function becomes weak or entirely lost through disuse, and this the more especially as nursery land is usually in good tilth and the plant growth is forced by high cultivation.

Do you know that you, Mr. Reader, and every other human being under the sun, have certain rudimentary muscles in the cheeks? They are the muscles that our ancestors used to flap their ears with; but they have become atrophied through disuse.

Thomas Huxley, the great English scientist, said so and he knew!

Well, I guess yes!

If you don't believe it we can show you the sun yet!

Is it not reasonable to suppose that the same law operates on all vital organisms, including the fruiting organs of trees?

Is not this fact sufficient to account for the relatively large number of drone trees in an orchard?

Is a drone tree any better than a drone bee?

Is it more respectable than a drone man?

Is it worth anything?

Is it really worth your while to spend eight or ten years of your young life cultivating, pruning, spraying, fertilizing an orchard—lavishing your love upon the trees—only to find at last that many of them are drone trees that bear “nothing but leaves?”

Root System

Modified by Different Varieties Grafted on Them.



THE top, the trunk and the roots have certain reciprocal relations to one another. Each affects the others to a certain extent. We will not attempt to explain the reason why, for we don't know, any more than we know why two and two make four instead of three or five. All we can say is that it is true.

And the proof is in the annexed photograph showing eight different varieties of apples budded or grafted on the same kind of roots and growing in adjoining rows in similar soil, and with cultivation that was exactly the same. Please bear in mind that the roots are all hardy French Crab seedlings of the same age, and that the difference between the trees was caused by certain habits inherent in the trees themselves. Each tree has habits peculiar to itself and each is first class of its kind. Some are short and stocky and others are long and lanky.

The first lesson we learn from the photograph is that trees vary in growth. The tops vary and the roots vary.

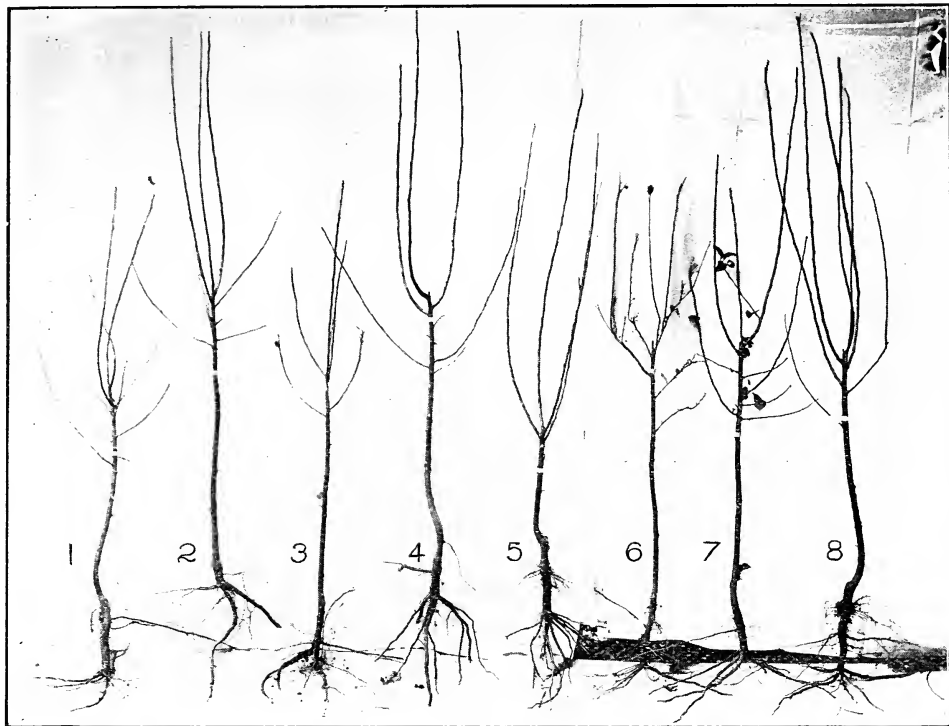
The second is that the planter who expects all his trees of all varieties to look alike in bigness and straightness expects the impossible.

Many other lessons we learn.

Like the mouth of Henry Clay, each tree speaks for itself.

There is not sufficient uniformity in the root variation to establish a law, and to clearly indicate a "constant" as applied to each variety; but still there is a visible difference. Our Laboratory of Research is making original and comprehensive studies along these lines and we hope to have some important announcements to make on this subject before long.

There is a well defined difference, however, between the tops of the different varieties, and these differences are so constant as to justify the formation of fixed rules; and these rules, being based on natural law, have no exceptions. Thus, when a nurseryman starts a number of apple grafts, he knows with certainty, in advance, that his Northern Spy trees will be tall, straight, with good stout bodies, and with branches growing upward like a pear tree; and he knows with equal certainty that the Canada Red will be small, spindling, and with very slender, spreading branches.



PHOTOGRAPH OF EIGHT VARIETIES OF APPLE TREES

1, Wealthy
2, Duchess

3, Hubbardston
4, Gideon


5, Yellow Transparent
6, Canada Red

7, Baldwin
8, Stark

Always.

And this similarity of results from similar causes is what gives us confidence in the integrity of nature. It is what Humboldt had in mind when he demonstrated that the universe is governed by law, fixed, eternal, absolute and inexorable.

Hardy French Crab Apple Seedlings

HE best seedlings on which to bud or graft apple trees are grown from seeds collected in France, where a race of hardy natural crab apples is found. The native habitat of this hardy crab is in the Basque country and in the highlands around Besancon amid the foothills of the Swiss Alps. The seeds are collected by the "*Montagnards*" about whom volumes of folk-lore have been written. As the name indicates, they are mountaineers.

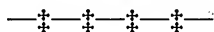
It was a "*montagnard*" who burnt his house to kill the mice.

They're dead!

Well, this French Crab Apple is hardy as an Oak, and has the remarkable property of withstanding drought almost as well as Montana sage brush. This is due, in great part, to its unusually strong root system which carries a large number of fibrous feeders.

Owing to the cheapness of labor in France and to favorable conditions for growing seedlings, arrangements have been made with certain French nurserymen (*pepinieristes*, they call themselves), to propagate seedlings for us. These are packed in huge wooden cases and reach us during the winter in time for grafting. Some are lined out in nursery rows and budded the following summer, with scions collected by our bud scouts from "Trees with a Record."

And thus are Greening's Pure Pedigree Bred Apple Trees propagated for your benefit.



Much of the joy water that is imported into this country from France under the name of Brandy, Cognac or Eau de Vie is made from the fruit of these native crabs; and your cup of joy will not be full until you plant an orchard of Greening's Pure Pedigree Bred Apple Trees budded on seedling roots grown from the seed of these self-same crabs. It is the law of life that all things move in circles!

Pear Trees



PEAR trees are propagated by budding on imported French pear seedlings. These are grown for us by the French nurserymen, the standard size being 7 to 12 millimeters in diameter, which is a little more than $\frac{1}{4}$ inch according to the American system of measurement. Like all other import stock they reach this country about Christmas time. They are stored in frost-proof cellars and, when spring comes, lined out in nursery rows to be budded the following fall.

Very few varieties of pears have originated in this country, nearly all of the popular kinds having come from France and Belgium. The very names they bear indicate this, the one great exception being the Bartlett. This came to us from England, where it is still known as the Williams pear. It was brought to this country by a man named Bartlett; hence the name.

Our pear scions are collected from the best bearing orchards in the country, thus putting our trees on a pedigree basis. The infusion of new blood has continued for several years and our pear trees of all varieties are TREES WITH A RECORD.

Plum Trees



PLUM trees are propagated by budding on Myrobolan Plum seedlings. These also come from France and reach us in midwinter. The methods of lining out in nursery rows and budding the summer following, as noted about apple and pear seedlings, are followed; and to avoid repetition let us say now that cherry seedlings come from the same source, at the same time and receive the same care and treatment in storing, planting and budding.

Also let it be stated once for all that all these French seedlings—apple, pear, plum, cherry and quince—are graded 7 to 12 millimeters in diameter; this being a strong quarter-inch in the American language. They are about the size of lead pencils when received.

Like all the rest of our fruit trees, our plum scions are collected by our bud scouts from trees of unusual merit—TREES WITH A RECORD.



AHALAB Cherry seedlings are used as stocks on which to bud our cherry trees, our experience having shown their superiority over the Mazzard seedlings which were once in very general use, and which are still used by a number of nurserymen. The chief reason for their continued use in some quarters is that they catch the bud more easily and consequently will produce trees cheaper than Mahalebs. They have a vicious habit of sending out suckers from the roots, however, and for this reason we have discarded them altogether. Of course our scions are all cut from TREES WITH A RECORD.



BLOCK OF GREENING'S LOW-TOP CHERRY TREES

This photograph illustrates a block of our low-top Cherry Trees, three-year roots, one-year tops. These trees will bear an abundance of bright, juicy cherries where you can get them, and not merely a few at the top of the trees to tease you, because out of reach. Observe that two trees in the right foreground are stripped of foliage to show the framework of the trees, and one of these was cut back to indicate proper pruning at the time of planting. These two trees are shown in an enlarged view on the opposite page.



BEFORE AND AFTER PRUNING

The above photo illustrates the manner of pruning to form a low-top tree. The two trees stand side by side in the nursery row, one of them being cut back to show the place and the way of forming the head. Compare the tree with height of the man's knee. Also observe the distance from his hand.

Planting Peach Pits at Greening's



THE machine shown on the following page plants about 1,000 bushels of peach pits at Greening's every year. Its capacity is about 75 bushels a day, one man and team doing as much work as fifty men in the ordinary way.

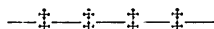
Leaning on the machine is the man who invented it. Read more about him in the personal memorabilia on page 55.

The small peach pit is from a Tennessee "native" peach. There are about 3,000 such pits in a bushel, each one full of life, vigor and growing power. W. W. Tracy, formerly of Michigan but now with the Department of Agriculture at Washington, once described a seed as "a plant packed for transportation;" and this is surely a great truth well told. There is a peach tree in that pit.

The large pit is from a domestic peach—a "tame" variety. There is not much in it except gum, ooze and slime.

And yet it is from pits of this kind—canning factory pits—that ninety per cent of the nurseries grow their trees.

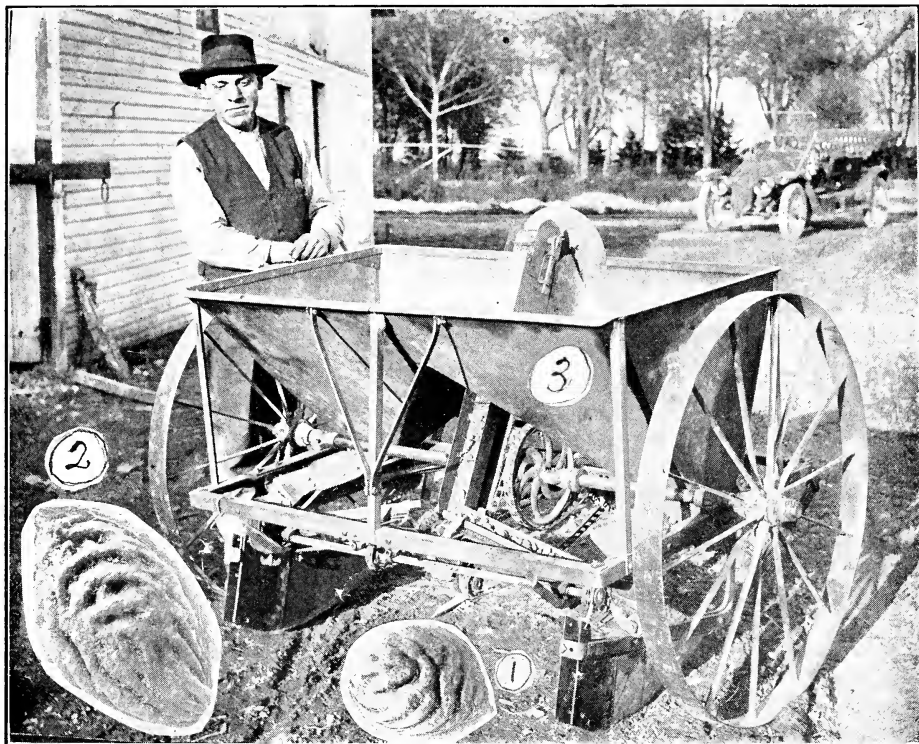
The fruit is all right to eat, but the pits have no prepotency. They are not fit to grow trees from.



As explained elsewhere Tennessee natural peach pits are gathered for us under contract. When they reach Monroe they are stored in our seed-house for further "curing," after which they are tested for germination and when the time comes to plant they are drilled in the ground with the machine illustrated on the opposite page.

This time is in the fall so the winter frost will open up the pits. In the spring they start growing and usually attain a height of three feet the first season. They are budded in September of that year. In the spring following the tops of the seedlings are cut away and by fall the buds have become marketable trees. Peach trees are always sold at one year from the bud.

In latitudes above Cincinnati it is customary to plant peach trees only in the spring, fall planting not being deemed quite safe on account of the nature of the tree.



REASONS WHY GREENING'S PEACHES HAVE STRONG ROOTS

First, we plant only Tennessee Natural Peach Pits.
Second, we plant with the Perfection Peach Pit Planter.
Third, our ground is in good condition and cultivation.
Fourth, our buds are taken from TREES WITH A RECORD.
Fifth, we dig with tree digger, using gasoline power.
Sixth, our system of storing trees is perfect to preserve vitality.
Seventh, our system of packing trees is equally perfect.

Natural Peach Pits

Are Gathered from the Mountains of Tennessee and North Carolina



HAVING discovered by our experiments that NATURAL PEACH PITS produce the strongest and healthiest roots on which to bud our Pure Pedigree Bred Peach trees we began to look around for a source of supply, that would be ample to meet the demands of GREENING'S BIG NURSERIES. To find a few pits was not very difficult, for it has long been known to scientists that wild groves of natural peach trees are found in the mountain regions of Tennessee and North Carolina; but to collect several million pits—well, well, well! ! ! Say did you ever try to count the hairs on a dog?

The task was stupendous; but the pits were needed to propagate the Greening quantity and quality of peach trees. That was enough!

"Impossible! That word is found only in the dictionary of fools," said Napoleon.

And whilst we were thinking of Napoleon we recalled another dictum of his to the effect that, "in war, men are nothing, a *man* is everything."

Perhaps it is the same in business.

Many of the so-called impossible things are being accomplished nowadays; and whilst most of us are sitting on the cracker box at the corner grocery declaring that "it can't be done," along comes a *man* who does it.

And so, after all, our problem consisted merely in finding A MAN—a man who knows the Cumberland country, who is on speaking terms with some of the mountaineers, and who does not look enough like a revenue officer to excite suspicion! And besides this man must possess organizing ability and be a manager of men.

William Morrison, is that man.

Morrison knows the Cumberland mountains like an open book. He knows the mountaineers, and the mountaineers know him.

Morrison is a diplomat.

Of course, diplomats come high, but we needed a man who can talk peach pits in six languages, at the same time—all with the same six shooter—and so Morrison was made minister pleni-pit-entiary to the mountaineers.

Morrison, his pits, they cost nearly a dollar a pound!

Two Kinds of Mountaineers



HERE are two distinct types of men that inhabit the mountains, each as different from the other as courage is different from fear.

First, is the political refugee, the man who fought the battle for freedom until his ammunition ran out, and then, overwhelmed by numbers he sought a refuge in the hills, where under the protection of the crags he continued the fight for life and liberty with rocks. Our revolutionary fathers were of this type and the Lord knows that better and braver men have never lived.

The Welshmen who took friendly shelter in the hills of Carnarven in the fifteenth century, as a refuge from the tyranny of Edward were no craven.

And the Scotch who retreated to the Grampian Hills, before the murderous advance of James were brave men; and these Scotchmen, oat-meal and haggis fed, have produced a race of men who are among the great industrial leaders of our time. Such are Andrew Carnegie, James Oliver, and Jim Hill,—the latter on his mother's side only.

This kind of mountaineer comes down from above as soon as the pressure is released from below.

BUT—

But there is a kind of men who inhabit the mountains from choice. They are men who have been whipped out by industrial competition on the plains, and as that kind of pressure is never released they stay up in the mountains. They have offended nature somewhere and Nemesis has them by the heels. They are bashful, timid, indolent, seclusive and otherwise.

You know some people are wise and others are otherwise. These people are otherwise.

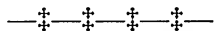
They shun society from choice. They live up in the mountains where the hookworm and the microbe of inaction thrive in their blood. With them work is a necessity, not a pleasure.

It is among mountaineers of this class in the Cumberland and Big Smoky Mountains that Morrison labors to gather Natural peach pits. He has gone from hut to hut, from shanty to shanty, and instructed the men, the women and the children how

to "cure" the pits so as to preserve their vitality; and thus are they gathered, a bushel here, a peck there, a quart somewhere else, until an aggregate of many hundred bushels are secured for Greening's Big Nurseries. In some cases the gathering of pits is in itself a sufficient source of income for the mountaineers to live.

These natural peaches are small and not very palatable, but some are eaten out of hand and others cooked or dried for food. The flesh, when fermented, is rich in alcohol and a fairly good quality of "moonshine" is distilled from it. In most cases, however, the flesh is thrown away, the fruit being collected for the selling value of the pits.

And thus does Morrison justify his mission as minister pleni-pit-entia to the mountaineers.



WEEDING 500 ACRES OF SEEDLINGS

As soon as the little seedlings peep through the ground, hand cultivation begins. This is done to break the crust and remove all weeds. It is necessary to use hand tools until the plants are about four inches high, after which the horse cultivators are brought out and their use continued all through the growing season. As one-third of our ground is in young seedlings each year, it means that at least 500 acres of land must be cultivated by hand every spring.

“Sprouting”



B UDDING is done in late summer and early autumn. Early in the spring following, before growth starts, the tops of the seedlings are cut down close to the bud, and the bud itself is nursed and coaxed and encouraged to become a tree. Of course, when a bud has failed to catch the seedling is not cut back. It is left standing so it can be seen easily at the time of grubbing, when it is removed entirely, root and all.

But, for a while, the seedling resents this treatment. It does not want to lose its own top and become a foster parent to a foundling baby bud that was slyly slipped into its lap, so to speak; and so, it sends out a lot of volunteer sprouts of its own from below the bud. These must be removed before they become large, and that is what this gang of workmen is doing. Each seedling is carefully examined and the sprouts removed



SPROUTING BUDS AT GREENING'S

by hand rubbing. This must be done three times during the season, until the seedlings are thoroughly subdued and all their energies directed to developing the buds into strong, well-developed trees.

The buds themselves are carefully inspected for “doubles.” There is a slight tendency, especially in the peach, for a bud to send out two shoots instead of one, in which case one is removed and the other is trained to a straight leader to form a tree.

All this is done under the direction of competent foremen who walk from one row to another and watch closely the work of the operatives. In the above picture the men who are standing are foremen.

“Strangers”



OME time ago a society belle went into a drug store intent on buying a bath sponge. A mere man waited on her, and in her trepidation she asked him for a sponge bath.

Tableau!

Transpositions like this are very annoying, but somehow we all make them. Do you remember when you first asked your wife for a kiss on her dear luby lips? Or, was it somebody else's wife?

Exactly!

Somehow the mind slips a cog and what we say or do is very different from what we think. That's how varieties get mixed in a nursery. A "one-man" nursery soon becomes a medley of mixed trees. The only safety lies in organization—a division of labor with expert supervision at every step.

Here is where the Greening organization looms up BIG, and our system stands out strong. It is practically impossible for "strangers" to appear in our nursery blocks.

The men who cut scions do that and nothing else. They can't go wrong.

The men who bud do that and nothing else. They can't go wrong.

The men who graft do that and nothing else. They can't go wrong.

The men who wrap do that and nothing else. They can't go wrong.

The man in charge of the buds is as solemn as a bishop and as mentally precise as a banker. He is custodian of the company's reputation, and he keeps his sacred treasure under lock and key. Every bud must be accounted for just as the daily balance in the Bank of England must account for every penny. When a package of buds is passed out it must receive the "O. K." mark of at least three checkers before it is handed to a budder to use; and the budder himself is required to repeat the name of the variety that is given him, just as the baggageman at the depot repeats your destination when he hands you your baggage check.

Each of these checkers not only checks the buds, but he serves as a check on the mistakes of the others. Every precautionary measure is used to guard against the introduction of "strangers" and to keep our stock pure.

And if, in spite of all our care, some vagrant bud creeps in it is speedily spotted by our superintendent of propagation and his assistants. Nothing escapes them. Their nerves are all in their eyes. They see everything.


For Years

it has been the practice of GREENING'S BIG NURSERIES to purify its stock every year by grubbing out all "strangers." Each variety has certain peculiarities that distinguish it from all others. The foliage—its form and color; the buds—whether prominent or depressed; the internodes—whether long or short jointed; the habit—whether spreading or erect; the glands—whether round, oval or kidney formed; a thousand things tell their story to the trained eye of the nurseryman. Even the root system is a sufficient guide as the reader may see for himself by referring to the illustrations on pages 22 and 23.

Our experts can tell one variety from another, even as a mother can tell which of her twins is Jim and which is John.

It is simply a question of sacrificing the "strangers;" and it has always been the Greening policy to grub out all "strangers," root and branch, in order to purify its stock. Greening patrons are entitled to the best there is in purity as well as quality of stock.

A Digression

 HE reader will please excuse a little digression. We have seen some blocks of trees growing in certain small nurseries, where the stock was all mixed—so hopelessly mixed that every tree was a "stranger" so to speak—where there were not enough trees of any one variety to say that any particular row was of that variety. In some cases the owners of these nurseries were themselves sublimely ignorant of the mixtures, for they did not have an organization of experts to protect them from error. We have even seen cases where the "wildings" and all were permitted to grow and the whole lot sold as budded trees!

With the common nursery practice of taking scions from nursery rows a blunder of this kind increases in geometric ratio until a whole nursery becomes a hodge-podge of mixed varieties.

If the Greening method of cutting scions from bearing trees to produce pure pedigree bred stock, did nothing more than tend to keep varieties pure it would be justified by the results.

“Wildings”



BUDDING is a very delicate operation. No matter how carefully the seedlings are prepared, no matter how watchfully the buds are selected, no matter how well the budding is done, some buds will fail to catch. A stand of 90 to 95 per cent of good buds is very rare. This means from five to ten per cent of wild trees. What shall be done with these

“Wildings?”

We say use the grub hoe and cut them out.

And no matter how careful we are in cultivating the trees, some buds will be broken in doing the work. Either the horses or the men or the implements will strike some off. Nothing but the wild stock is left. What shall be done with these “Wildings?”

We say use the grub hoe and cut them out.

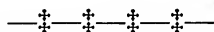
And suppose a hail storm or a strong wind storm strike the nurseries before the buds are well knit and a good union made, more buds will be broken off, leaving only the wild seedling stock. What shall be done with these “Wildings?”

We say use the grub hoe and cut them out.

And still further, no matter how well we mulch, especially if there is not much snow on the ground to protect the young, tender buds, a few will be killed off by the winter, and nothing but the wild stock be left. What shall be done with these “Wildings?”


We say use the grub hoe and cut them out.

No, it is not all fun this business of growing trees. And it is not all profit either.



But, what is worth doing at all is worth doing right, and we shall continue to grub out all “strangers” and “wildings” and keep our stock as nearly pure as human ingenuity can make it. And whether it pays or not as the world accounts profit, we shall at least continue to have the confidence of planters and, what is of equal importance, the feeling and the knowledge that we deserve it.

“Grubbing”

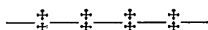
 HIS is an operation whereby the stock is purified of all “strangers” and seedlings that have failed to catch the bud and are, therefore, wild varieties. This operation requires more moral courage than physical force. It is the supreme test. The honesty of a nurseryman is determined and measured by his willingness to use the grub-hoe. The grub-hoe should be the emblem of the nurseryman's association and worn by all nurserymen as a badge of honor.

We have heard much of the man with the hoe; now let some genius arise and tell us of the nurseryman with the grub-hoe.

Greening's Big Nurseries have an invariable rule to grub out all “strangers” and “wildings” without regard to cost or sacrifice. It means a diminution in profits, but it is worth while to have the confidence of the public and, above all, the satisfaction of knowing that we have done our best to deserve it.

And say, it does make a nurseryman feel good, when he has gone all through his nurseries, block after block, row after row, grub-hoe in hand, purifying his stock, cutting out all “strangers” and “wildings,” and he stands before the world, amid a forest of trees, under the eternal blue, and the very sun in heaven bears witness to the purity of his stock and the integrity of his soul.

Oh, what is mere money compared to the great joy of doing right!



And yet we know some nurserymen who are strangers to this joy. We have seen blocks of nursery stock in which half the trees were “wildings,” and which were all dug and sold as tame varieties. They had been budded, and if the buds did not catch or were broken off, whose fault was it? So there!

And the loss was passed on to somebody else.

Greening patrons do not have to bear such losses. Greening's Big Nurseries have both the willingness and the ability to stand their own losses.

Insects



It was the theory of Malthus that life is contingent on the food supply and that population continues to increase until the supply becomes insufficient, at which point a sudden check takes place and then a diminution follows. Malthus enunciated his philosophy with special reference to human life, but it is just as true with regard to all life, including that of insects.

There is an abundance of food supply for insects at Greening's Big Nurseries. Our rich soil, intense cultivation, and enormous area planted with young trees would be a great feeding ground for insects if they ever got a foothold and, indeed they make a big "try" to do so. They seem to be guided by some instinct which tells them that here is the place to "increase and multiply;" for moths and butterflies come from all directions, hover over the nurseries a while, and then swoop down on our little baby plants to deposit their eggs; and in a little while, as our Englishman says, "there is 'ell to pay."

It is true that some insects prey on others and there is a tendency for them to keep each other down. Thus the ladybug is a friend of man by devouring the eggs of predacious insects, and a nurseryman in the south is trying to educate the bed bug to feed on aphides. We sincerely hope he will succeed as we always regarded the bed bug as a big bundle of misdirected energy.

"The little fleas that do us tease
Have other fleas that tease them;
And these in turn have other fleas,
And so it goes ad infinitum."

But we do not depend altogether on the parasitic insects to destroy those that do us harm; and so throughout the season every growing tree is examined several times by our entomologist and his assistants, and if any colonies of insects are found they are speedily dispatched.

It is astonishing how troubles disappear when they are bravely met. Spraying did look like a formidable proposition when it was first introduced; but with greater knowledge came greater confidence, and today spraying is an exact science practiced by everybody with mathematical precision.

Several of the Greening publications give formulas for destroying insects.

“Let Us Spray”



PRAYING is a method of applying liquid solutions to destroy insects and fungous diseases. It is done by means of a powerful pump to produce the pressure, and a nozzle or nebulizer to break the stream into a mist or fine fog that completely envelopes the tree.

It is like the atomizer of milady's boudoir multiplied a thousand times.

The only difference being that the spray pump uses poison and the atomizer—well, we don't know what the atomizer uses!

Successful spraying requires the solution of three distinct problems.

We have solved all three.

First, the biological problem, to determine the life-history of each insect and thus be enabled to fight it at its most vulnerable period. Our entomologist is a graduate of the Michigan Agricultural College and devotes all his time on our grounds to the study of insect life as it effects our nurseries.

Second, the chemical problem, to determine the proper ingredients to use and the most effective strength to destroy all insects and fungi without injuring the trees. Our chemist is an insect fighter by pre-natal tendency and he is a very practical man.

“And when he squirts his little hose
With dope that never fails,
The bugs upturn their little toes.
And curl their little tails ”

We don't know whether this is poetry or not, but we do know that it is true.

Third, the mechanical problem, to devise a machine that will apply the solution evenly and with sufficient pressure to deposit the deadly drops on every part of the trees that require spraying. This problem was solved by our master mechanic, Mr. John W. Romine, whose experiments have resulted in the production of a sprayer which is as near perfection as the ingenuity of man can attain.

These three experts work together. Each supplements the work of the others. The three are one. And together they make life very unpleasant for the insects at Greening's Big Nurseries.

The Evolution of the Greening Nursery Sprayers



The question of thorough and effective nursery spraying has been considered the most stubborn problem for the nurserymen of this country to solve.

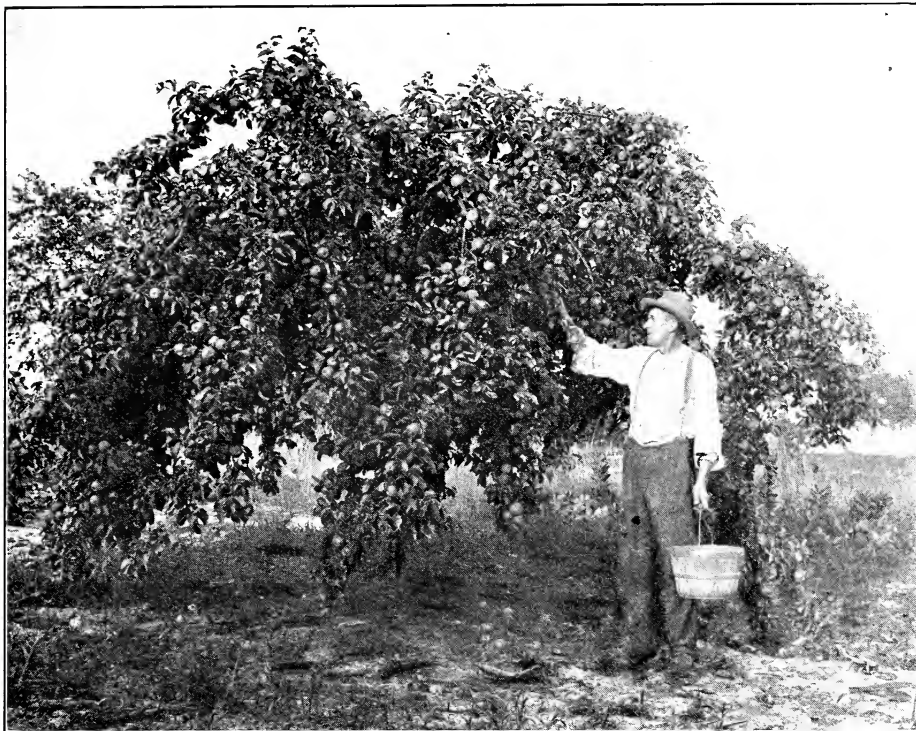
We started to solve this problem some years ago on original lines of mechanical invention and have actually built four different styles of power nursery spraying machines. The picture here shows the different kinds we have built, some of these machines being kept on hand as relics to show the great advancement made in building new sprayers.

Figure 1 was our first effort. It straddled two rows and the power was applied by sprocket wheels and chains.

Figure 2 was our next machine. This also straddled two rows. The pressure was supplied by carbonic acid gas.

Figure 3 represents our third attempt. It was mounted on two low wheels close together to go between the rows. This is the most successful type for spraying two or three rows at one time. Power is transmitted from the wheels to pump and compress chamber by means of sprocket wheels and chain. It develops a pressure of 150 pounds.

Figure 4 is our latest invention. It is operated by gasoline power and comes nearer to perfection for nursery spraying on a large scale than any other spraying machine ever invented. All of our sprayers are built on our own grounds and by our own expert mechanics.



PERFECT TYPE OF LOW-TOP FRUIT TREE

For a number of years we have advised orchardists to plant young trees and train them low. This advice was followed by many of the most progressive fruit growers and they have become enthusiastic advocates of the low-top system. What was once a theory is now a demonstrated fact. Send for our Low-Top circular.

The above picture shows the great advantage of a low-top tree. Nearly all the fruit can be gathered by pickers standing on the ground.

We grow both low-top and high-top trees to suit the individual ideas of planters.



MAMMOTH BLOCK OF PEACH TREES

Block of 2,000,000 Low-Top peach trees growing at Greening's Big Nurseries. The seedlings were grown from Tennessee Natural Peach Pits and the buds taken from bearing trees of unusual merit, thus infusing each variety with the best blood of its kind. The photo was taken after three months' growth and represents what is positively the largest and finest block of peach trees ever seen in the world.

Some qualities nature carefully fixes and transmits, but some, and those the finer, she exhales with the breath of the individual as too costly to perpetuate. But I notice also that they may become fixed and permanent in any stock, by grafting and regrafting them on every individual, until at last nature adopts them and they become her own legitimate fruitage.

—Ralph Waldo Emerson.



DIGGING TREES BY GASOLINE POWER—A SCIENTIFIC TRIUMPH

Progress is the watchword of the American people. This progressive spirit has manifested itself in the invention of a tree-digging machine, by means of which all kinds of trees, ranging in size from the dwarf-growing kinds up to large shade trees 15 and 20 feet high, may be dug without the slightest danger of bruising or injuring the roots. As shown in the illustration, the ground has been dug away directly back of the digger, exposing to view the steel blade and lifter of our modern tree digger, running at the time under our mammoth block of whole-root apple trees at a depth of 30 inches. Do not such methods appeal to an intelligent people? With these facilities we are able to furnish trees with abundant masses of fibrous roots, such as will grow and make splendid orchards of strongest fruiting power. The power that operates this machine is a gasoline tractor, the invention of our master-mechanic. It was designed and built in our own shops and used for the first time in the fall of 1912. It represents the last and greatest step in nursery invention.

Is there not something tenderly poetic in the thought that even trees have preferences, that they have loves intense and deep as sway the hearts of men, that little Cupid is the magician, the enchanter, that changes soil to sap and thrills the veins of trees with tremulous desire, that every blossom is a throb of joy, longing for the divine swoon of love's embrace?

Greening's Fumigating Houses



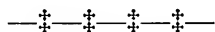
HERE are some insects so very minute, and yet so tenacious of life that they resist, to some extent, the action of spraying solutions. This is especially true of certain insects which exude a gummy substance that forms a protective covering over their bodies. And, as a rule, these insects are so very prolific that a single fertilized female that escapes destruction has a potential reproductive capacity running into the billions in the course of a single season.

It would never do to run chances on that little suffragette remaining at large.

Greening trees are not only pure. They must be above suspicion.

And so we have erected two fumigating houses after designs originated by Mr. Chas. E. Greening, the president of our company, in which every tree that we grow is fumigated with hydrocyanic acid gas, which has great penetrating power and is very deadly. This is done as the trees are dug and brought in from the fields, when the trees themselves are resistant to all harm from the gas, because thoroughly ripe and dormant. Our two gas houses have a capacity of 150,000 trees a day.

And thus is assurance made doubly sure at Greening's. Every shipment of trees that is sent out bears the clean sheet certificate of the state nursery inspector.



There is an unfounded fear in certain quarters that trees are injured by fumigation. That there is no reasonable cause for this fear, when the work is properly done, is shown by the fact that fumigation is recommended by the highest horticultural authorities, including the scientists in charge of all the state Experiment stations. The only danger lies in improper use of the chemicals by certain small nurseries that have untrained help or insufficient equipment.

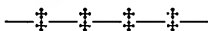
There is absolutely no danger to the trees when the work is done according to formula. The Greening organization works with scientific precision.



OUR FUMIGATING HOUSE

TREES FREE FROM DISEASE AND INSECTS—FUMIGATING

Pursuant to the requirements of the state law, we have built two large fumigating houses in which all stock is thoroughly fumigated before shipment, with Cyanide of Potassium and Sulphuric Acid, as prescribed by law, which absolutely destroys all insects and every form of fungus, without injury to the trees. A wagon load of steam-dug trees, showing large bunches of roots, has been brought into the fumigator, and our chemist is in the act of putting in the charge of chemicals previous to closing the air-tight doors.

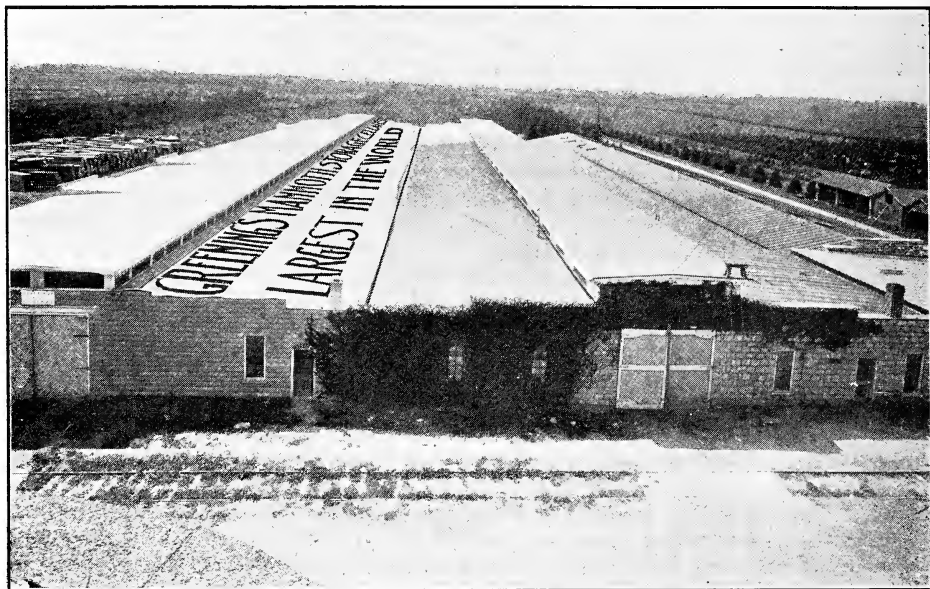


A recent bulletin of the Department of Agriculture, at Washington, recommends the use of the same chemicals for the destruction of our household enemies—rats, mice, cockroaches, ants, crickets, fleas, bedbugs, etc. The bulletin is free.

The Cavesium



HIS illustration represents our mammoth tree storage cellar, the largest structure of the kind in the world. One of our visitors, who is somewhat of a globe-trotter, and who is accustomed to seeing big things, called it the Cavesium, the name being an adaptation from that of the Coliseum at Rome which it resembles—in size.



OUR MAMMOTH STORAGE CELLARS—LARGEST IN THE WORLD

A Kentucky Colonel called it the Mammoth Cave, because, says he, “it reminds me of the big hole in the ground down in Edmonson County.”

But, by whatever name it is called, it is certainly the largest building in the world used exclusively for storing trees. The only other structures which are at all comparable to it are the immense cotton warehouses in Memphis.

Millions of trees are stored in this cellar during the winter and kept in perfectly natural and normal condition. This cellar, humble though it be in looks and name, is a scientific triumph and makes possible the immense operations of Greening's Big Nurseries. Only a picayunish nursery of very diminutive size can get along without a storage system.



JARRING THE
SOLAR SYSTEM

But there are plenty of these small chin-whisker nurserymen throughout the country, with nurseries about the size of their souls, who will declare, gosh all hemlock, that it can't be done, that 'taint "nat'ral;" but by the time the stock of these small nurseries reaches you, say about the middle of next May, with an explanation that it was a wet spring and they couldn't dig earlier, and it was a severe winter and the trees are partly dead, you will wish they were a little less "nat'ral" and more progressive.

Like most good things the discovery of a perfect system of tree storage was accidental; but, for the perception of the fact when presented, great credit is due Mr. Benjamin J. Greening, the present general manager of this business, who caught and hog-tied the idea, and made it practical by actual demonstration.

Greening trees are kept in a perfectly natural condition—and that condition consists of the human equation.

Of course, the temperature must be right. The moisture of the moss and the humidity of the air must be right. But something more is needed. The human factor cannot be ignored.

The very presence of the men working among the trees in the cellar, day after day during the winter, tends to the betterment of both.

Man is a little brother to the trees.

But there is the further fact that the men, walking to and fro at their work of billing out stock for early spring shipment, keep the air in circulation, a condition which is conducive to freshness, liveliness and healthfulness. The opening and closing of a door is, of itself, sufficient to create air currents. This is in accord with the natural law that all things act and react upon all. Physicists tell us that a child cannot throw a ball in the air without jarring the solar system!



This rick of trees belongs to the Grand Traverse Fruit Co. Mr. E. J. Warren, president of that company, came down to Monroe and after inspecting our stock placed an order with us for many thousand trees. The different varieties were selected and re-ricked in his presence—and with his assistance, for he gladly joined in the work. Mr. Warren is seen leaning against his trees and our president, Mr. Chas. E. Greening, stands with arm extended inviting you to “come and do likewise.”

Our wonderful storage system is in itself a scientific triumph worth making a long journey to see. There is no incipient growth to waste the stored up energies of the trees. Every bit of vitality is retained. And thus has come about the slogan that,

“GREENING’S TREES GROW.”

HISTORY
—OF—
GREENING'S BIG NURSERIES

FROM THEIR INCEPTION TO THE
PRESENT TIME
INCLUDING
A BRIEF EXPOSITION OF THE METHODS OF
HORTICULTURAL INVESTIGATION
PURSUED IN OUR
LABORATORY OF RESEARCH

BY
A. FERDINE LANGLOIS

Ancient History

THE late John C. W. Greening, founder of the Greening Nursery was a professional gardener in Germany. He came to America in the early forties and began the practice of his profession in Monroe, Mich. True to the instincts of a gardener he started the propagation of trees in a small way, and there was probably a time when he did not know himself whether he was a gardener, a fruit grower or a nurseryman. The idea grew slowly, as ideas do in pioneer life, but a beginning had been made, and by the year 1850 the Greening Nursery was a well recognized local institution operating on one and one-half acres

of land. Mr. Greening underwent the usual vicissitudes and discouragements of life in a new country, but his trees found a market, and what is of far greater importance he had found himself. From this time on he devoted all his energies to the nursery business which he continued until his retirement in 1883, when his two sons George A. and Charles E., took active control of the Greening Nurseries.

In the blessed year aforesaid these two brothers became equal partners in the enterprise and at once began to apply American methods in conducting their business. Ancient devices, sacred to the fatherland, were discarded, and new implements adapted to American conditions

were introduced. American business methods were also adopted and then began that fusillade of advertising which has made the name of Greening known wherever the English language is spoken. Even the name was Americanized for about this time the German double-dots were discarded and the spelling took the form of Greening.

A great team were the Greening Brothers. Together they labored and prospered. Year by year the output of the company was increased until the spring of 1900 when the sales reached the astounding total of \$50,000! Great Heavens! Enough to pay the national debt ! ! !



JOHN C. W. GREENING
Founder
Greening's Big Nurseries

History of the Middle Ages



OUR HUMBLE BEGINNING IN 1883

But joking aside the sum did look big to the boys at the time, which shows that all life after all is simply a matter of perspective. Judged in the light of the present business output how insignificant it now seems!

About this time certain untoward circumstances caused the retirement of George A., and Charles E. Greening became sole owner and manager of the business, which was incorporated in 1902 as the Greening Nursery Company, with a capital stock of \$200,000.00, all paid in. At this stage of growth the firm operated 700 acres of land and had a yearly sale of about \$100,000. Surely the young firm was making head ! !

Modern History



Men become great in proportion to the burdens they bear. Responsibility gravitates to those with ability to make good. And perhaps the greatest praise that can be bestowed on Charles E. Greening is that he has made good, not only in the management of his great nurseries but in all the activities of his life, and in every undertaking to which he has contributed, either as worker or counselor.

His great success comes from his ability to concentrate on the work in hand, and do it with great thoroughness. He is a man of stupendous energy, and wherever he is he is always present. He is still in the prime of life, somewhat worn from overwork, but what is left of him is still here. He spends his summers at his country home, his winters in Florida, and all his time in useful work. He is generally recognized as one of the foremost horticultural authorities in America, and his scientific genius entitles him to recognition as the second Burbank of the Nation, his studies in the up-breeding of fruit trees, for instance, by the selection of scions from bearing trees of unusual merit will add many millions of dollars a year to the wealth of fruit growers. In the world of art he is widely known as the originator of the Pictorial System of Landscape Gardening, and author of the book bearing that name. During recent years he has gradually



CHAS. E. GREENING
President
Horticulturist and Scientist

withdrawn himself from the management of his great nurseries leaving most of the work to his son Benjamin, very much as our old friend "Jim" Hill has slowly inducted his son Louis into the intricacies of the railroad business.

Some one has said that genius is only another name for hard work; but in the case of Mr. Greening it is both. He works with such impetuous determination and resolute endeavor that no obstacle can withstand the attack of his will power, once he has resolved on a course of action. It is hoped that his partial retirement from business will afford him more time to pursue his scientific investigations, the subject which is uppermost in his mind at present being the top-budding of fruit trees to eliminate defects.



BENJAMIN J. GREENING, vice-president and general manager, is the oldest son of Charles E. Greening and is thirty years of age at this writing. He was born in the old homestead and represents the third generation of the family in the management of the business. His life is contemporaneous with that of the rapid development of Greening's Big Nurseries and he has grown big with them; for he is in truth a big man—big physically, big mentally, big in heart, big in action, big in his matchless business generalship, and above all he is big in his brimming optimism. He governs men unconsciously, and men submit to him unconsciously. He is big enough to let subordinates have their own say, and in the end, have his own way. He enforces only one rule, and it is that everyone about him must wear a smile. He is too busy to formulate a philosophy of life, but some day it will be written in this from:

“Smile a while
And while you smile
Another smiles,
And soon there's miles
And miles of smiles,
And life's worth while
Because you smile.”

This cheerful mental attitude enables him to bear the burden of responsibility without wobbling, and every week he looks a pay roll of several thousand dollars straight in the eye without blinking. His helpers are devoted to him and with them all the gentle expression of his every wish has the force of a military command. He is genial and affable without being effusive, and visitors at the nurseries never forget the cheery tone of his voice, whilst his warm hand-clasp squeezes the rheumatiz out of the most perverse natures.

Everybody calls him Ben. Stiffnecked dignity has no place with him. He knows that in America one man is no better than another—unless he is.

And above all he knows that organization is the secret of successful business; and so knowing he has gathered about him a force of efficient helpers. What Ida Tarbell said of Standard Oil is also true at Greening's: even the office boys are hired with a view to their possible promotion as department managers.



BENJ. J. GREENING
Vice-President
And General Manager



ROY M. SPERRY is Secretary-treasurer and office manager of Greening's Big Nurseries. As may be judged by his official titles he has many duties to perform. As secretary he attends to the vast correspondence of the business, and as treasurer he is custodian of the company's ginger jar.

When an agent sends in a bunch of orders it is Mr. Sperry who slaps him on the back and says, "Good for you old fellow; do it again;" and at the same time he passes him out a check which is exchangeable at any bank in the United States or Canada for good coin of the realm or paper of the republic. And thus does he keep the machinery of business going by lubricating the wheels of life. As office manager he

distributes the departmental duties among a corps of efficient helpers and together they take care of the clerical end of a business aggregating several hundred thousand dollars a year, and which the present rate of expansion would indicate will soon reach the million dollar mark. Mr. Sperry entered the service of this company as a stenographer in the year 1895 and his promotion to the present responsible position that he holds came as a just appreciation of the ability, fidelity, and devotion to every duty which has characterized his work during the long period of his connection with our firm.



ROY M. SPERRY
Sec'y-Treas. and
Manager of Offices

Like every other efficient worker, Mr. Sperry gets his enjoyment out of his work, and thus does he prove the fact that labor is a blessing and not a curse.

Photography is his hobby. His camera is his chum. Many of the pictures illustrating this book were taken by him. His talent in this direction has made him official photographer of the Greening Nurseries; and it is very seldom indeed that a good view escapes his eye or the eye of his camera. Many of the visitors at Greening's are either "snapped" unawares or asked to "look pleasant, please;" and after a little maneuvering—a pressure on the bulb—a click of the shutter—and the trick is done. These photographs become a treasured possession of the company, as well as of our guests, who thus retain a permanent souvenir of their "Visit to Greening's." That Mr. Sperry is a good photographer is shown by the fact that he photographs good people. No picture taken by him has ever yet adorned the rogue's gallery.

Master-Mechanic at Greening's Big Nurseries



HIS is an age of invention. The world has been made over again during the last fifty years. And one of the world makers who stands in the very front rank of creators is John W. Romine, master-mechanic and inventor, who has woven from the web of his genius a fabric of mechanical thought that stands without a parallel in the field of nursery operations. He is chief of the engineering staff at Greening's Big Nurseries, and, with the assistance of his son Wilbur, he has devised many labor saving contrivances.

Before his time it was customary to plant peach seeds by hand, an operation which was slow, tedious, and tiresome. Imagine planting 3,000,000 peach pits by hand! And so, Mr. Romine with a prophet's vision had a dream, and he proceeded to materialize his dream by the construction of the Perfection Peach Pit Planter which distributes the pits evenly, at the right depth and with just the proper pressure on the soil. This machine makes possible the growing of peach trees on a large scale, and also insures a uniform and vigorous growth by spacing the seeds with mechanical precision.

Another of Mr. Romine's inventions is a power spraying machine for nursery use. This machine is so well ordered in its every part that the solutions used are applied with great force, and always at uniform strength, thus attaining with absolute certainty the results for which spraying is intended.

Mr. Romine is now at work on a 60 horse-power cultivator, operated with gasoline, which will cultivate from four to six rows of trees at one time. This machine has all the fine adjustments of an automobile and can be operated in the usual way, transversely or diagonally as desired.

Many other inventions Mr. Romine has made.

And the end is not yet. He is still in the full prime of creative power and more devices for the betterment of life will come from the brain of this wonderful man.

"And still they gazed
And still the wonder grew,
How one small head
Could carry all he knew."

See picture of Mr. Romine on page 29 where he is shown leaning on his Peach Pit Planter. The sprayers shown on page 40 are the children of his brain.

Mixing Brains



HEN Opie, the great Welsh painter, was asked how he produced such wonderful pictures, he answered simply, "I mix my brains with my colors."

This is a good formula.

There is no known substitute for brains.

Years ago we began building up an organization of experts in all departments and today, Greening's Big Nurseries comprise the greatest combination of horticultural talent the world has ever known.

Some of these men have been with us for over twenty years.

Others came to us after a varied experience elsewhere.

Every man on our force is an incubator of ideas.

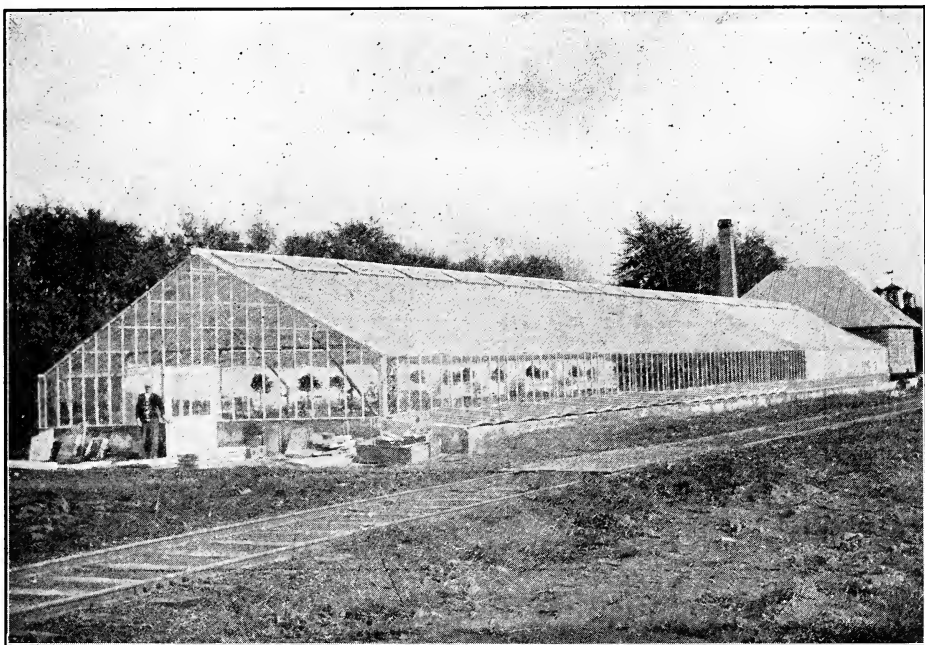
The man who can't incubate is not happy at Greening's.

But the real creators—the men with ideas—find here every opportunity to develop their talents. For such people Greening's Nurseries are a sacred shrine.

"Within these nurseries they feel
Like one who clasps a shrine,
When the glad lips at last have touched
The something deemed divine."

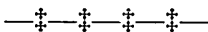
And here they are—hundreds of big brainy men—each one mixing his brains with his work. All kinds of nursery brains are here—soil brains, propagating brains, mechanical brains, storage brains, bug brains—all brains that are not bughouse—and this combination of brains working together have made possible and true the slogan,

"Greening's Trees Grow"



GREENING'S LABORATORY OF RESEARCH

This is the place where ideas are tested out—where we “try all things and hold fast to that which is good.” Horticultural students from all parts of the world come here to study our methods of research and thus are the Greening ideas slowly but surely circling the globe. Some of these students remain with us to work out their own ideas. Every one is given a chance to demonstrate his theories.



Out in Orange, N. J., there is another Laboratory of Research, conducted in the same way but along different lines. It is that of Thomas Alva Edison. Mechanics with an inventive bee in their bonnet go and buzz around Mr. Edison's molasses barrel, and they do manage to convert a lot of raw mental saccharine into the refined product.



A FIELD LECTURE ON SOIL RENOVATION

The Greening Nurseries are noted for their soil fertility, which produces a very luxurious growth of trees. The secret lies in scientific tillage. Many Agricultural Colleges send their students here for postgraduate study, and this view pictures Mr. Greening delivering a field lecture to them on green manuring.

About thirty-five years ago the germ theory was advanced, and its development since that time has given precision to the science of medicine. At first they were classed among animals, but they are now known to be plants, resembling somewhat the yeast plant that makes dough rise; and the same conditions that make yeast active, viz., heat and moisture, will develop other germs.

Over 1,200 varieties of soil bacteria have been isolated and classified and more are being found every day. But the work is just beginning in this country. European students have been busy in this direction since 1874, when Nobbe and Hinter discovered the fixation of nitrogen from the air by means of micro-organisms in the soil. Berthelot, Deherain, Stoklasa, Beijerinck and Bouilliac are among foreign scientists pursuing this branch of investigation. The roster sounds like a socialist caucus in "de fift ward."

Why the Seeds of Domestic Fruits Do Not Make Good Seedlings



HERE are two reasons for this. The first one is that our choicest fruits are the result of cross-breeding and they are not only weak in germinating power, but their seeds do not produce seedlings of uniform quality and vigor.

The other reason is that the best fruits are either eaten out of hand or are sold for domestic consumption, and their seeds are necessarily lost. Only the culls find their way to the canning factory and the cider mill where the seeds can be cheaply gathered in sufficient quantities for propagation. These culls are culls, chiefly because the trees that bore them are diseased or enfeebled by neglect; and it is certain that the seeds they produce bear many a taint. To propagate peach trees, for instance, from seed obtained at the canning factory, or apple trees from seed gathered at the pomace pile at the cider mill, as is the practice of many nurseries in this country, is a very unwise and dangerous proposition.

True, the seeds are a by-product and cost nothing or next to nothing; but are the roots they produce worth anything? Are the trees budded or grafted on these roots worth anything?

Aye, there's the rub!

We say they are not!

GREENING'S BIG NURSERIES have spent over \$50,000 in experimenting with peach pits alone, gathering them from every available source, sorting them by hand, cleaning them with chemical disinfectants, testing for germination, etc., and after noting results for a term of years we know that NATURAL PEACH SEED is the only seed that will produce perfectly healthy roots, and trees budded on them, will grow to maturity without any taint or touch of disease in them; and for this reason they will bear better fruit and more of it, they will live longer and make more money for fruit growers than all the trees ever propagated from all the factory pits and pomace piles of all this earth.

And this explains why we have originated and installed a system of seed collection in different parts of the world, our collection of peach pits alone amounting to several hundred bushels a year.

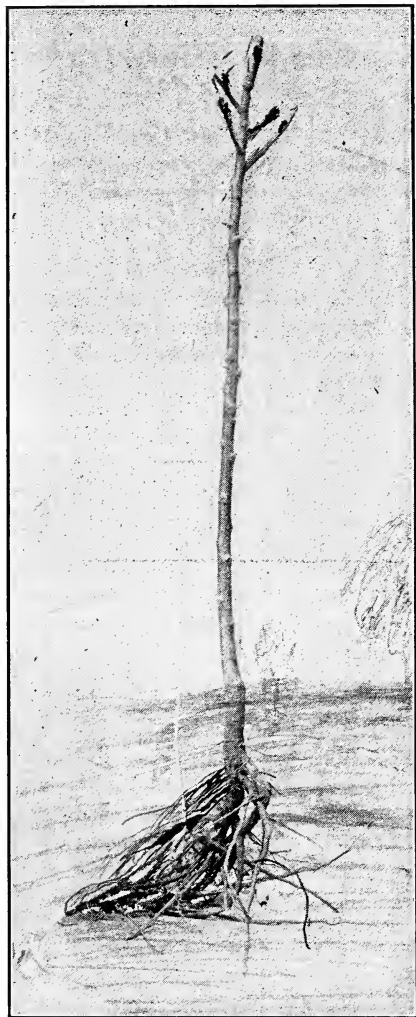


ILLUSTRATION OF TOP-BUDDED TREE

Top-Budded Trees



THE fact that each variety grows in a certain way with dependable constancy, enables us to take advantage of the good points and eliminate the poor ones of all varieties.

Thus the Wagner is a good apple and an early bearer, but its sap starts so early in the spring that it is quite subject to sun scald on the south and west sides of the trunk. Suppose it be top-budded on a variety which is resistant to sun scald, you overcome its weakness.

The Northern Spy is one of the best apples we have but it is slow in coming to bearing. Suppose it be top-budded on a precocious variety, you hasten its maturity—virtually put an old head on young shoulders. Is not that worth while?

The Canada Red stands head and shoulders above most varieties in quality, being at least equal to the best in this respect. Suppose it be top-budded on a vigorous variety and you make it a strong, sturdy tree, have not you got a prize though?

What do you think about it?

That is exactly what the Greening service offers you.

Prizes all along the line.

All the defects removed.

All the qualities improved.

All the good boiled down—concentrated and consecrated for your good.

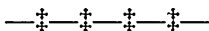
All the bad boiled out—expurgated and exterminated for the good of all.

It is true that the fruit grower can, and sometimes does, top-work his own orchard trees to eliminate many mistakes made in his planting; but it is better to avoid mistakes, or, at least, reduce them to a mere chemical trace by using the Greening service.

That's why we have built up our vast organization of experts; and this combination of talent, skilled in all branches of horticulture, is constantly working for your good.

More than a generation ago, Lincoln, greatest of our mighty dead—standing as he did on the very verge of crumbling time—gave expression to this bit of political philosophy,—“The object of government is to do for the people what they cannot do so well for themselves.”

And today, after sixty-two years of devotion to the science of tree propagation, we say that the object of the Greening Nurseries is to render to fruit growers a better service than they can possibly render themselves.



“If I knew I were to die to-morrow I would plant a tree to-day.”

—Stephen Girard

How Cross-Breeding of Fruits Is Accomplished



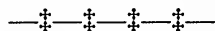
HERE is sex in trees. There is sex in all vegetation—even in the meanest weeds. The blooming of a flower is simply a manifestation of the cosmic urge. A tree in bloom is a marriage feast.

The male elements are known as stamens.

The female elements are called pistils.

In some trees both are present. With few exceptions, such trees are capable of self-fertilization. Other trees are unisexual and are not fruitful unless mated.

According to present botanical knowledge fifty-seven species of plants are self-barren and must be cross-pollinated in order to produce fruit. By species we do not mean varieties of fruit, but whole family groups—the Ulmaria, for instance. It happens, however, that some branches of the Rosaceae family, which includes all our popular domestic fruits, are very weakly sexed. Our Laboratory of Research is experimenting along these lines and much valuable information will be ready for publication in the course of another year.



If the hand is passed over a flower when it is mature a fine yellow dust will adhere to it. This is the pollen, the fructifying principle, that makes the flower fruitful. Nature has provided ways for conveying this pollen dust to the pistils, which in turn convey it to the ovary and impregnation takes place. A fruit results. One of the ways is for the pollen sack, known as the anther, to break with such force that the pollen dust is scattered over the surrounding stigmas. Another is the secretion of nectar in an organ known as the nectary. This attracts bees, and as they flit from flower to flower their fuzzy bodies become covered with pollen which they carry from the anthers of one flower to the pistils of another and cross-pollination takes place.

A curious thing is that when flowers are cross-fertilized they bear better fruit than when fertilized with pollen from the same tree, probably for the same reason that a young man thinks more of a neighbor's girl than of his own grandmother.

But man has a way of interfering with or assisting in this work of cross-pollination in order to arrive quickly at certain desired results. For instance if he has a good

white apple and a poor red apple he will cross the two in order to get the bright red skin on the pale apple. This is done by emasculating a flower of the white apple, that is to say, by removing its stamens with a pair of scissors to prevent self-fertilization. The flower is then enclosed in a paper sack to prevent the promiscuous introduction of foreign pollen. At the proper time the operator cuts out the stamens from a flower of his red apple tree, applies the pollen dust to the pistils of the flower he has prepared on his white apple tree, and a cross results. The seeds from this apple are then sown and they will produce fruits possessing the qualities of both parents.

These in short, have been the methods of Luther Burbank.

If a good apple results, the only way to propagate it and perpetuate its goodness is by budding or grafting. If we try to propagate it from seed the chances are that it will revert to the original white apple, or the original red apple, or worse, probably for the same reason, as physiologists tell us, that negro blood, however diluted, is never lost.

This is the same fact referred to in a previous chapter, but viewed from a different angle

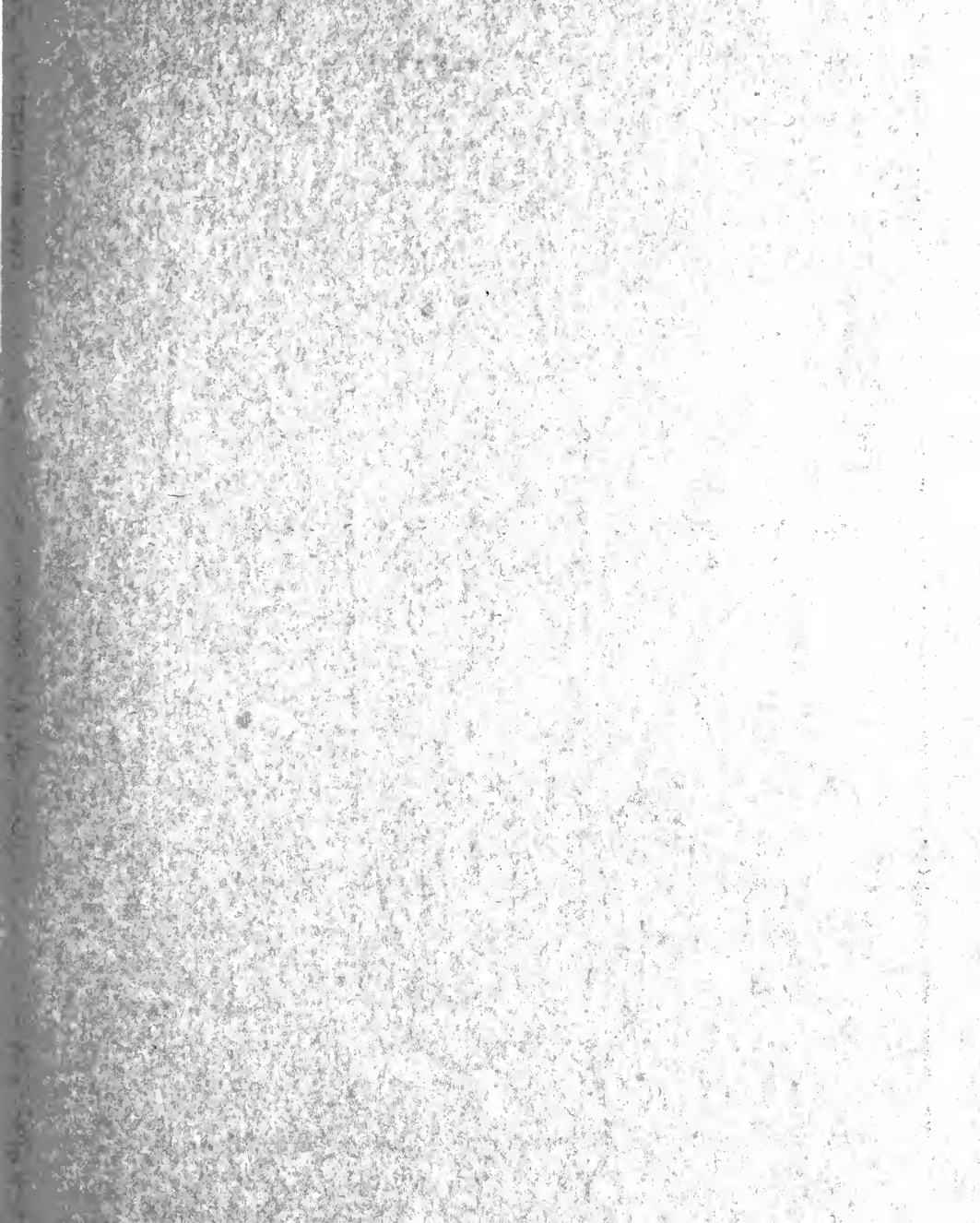
THE FACT THAT GIVES THE NURSERYMAN HIS JOB.

Agents Wanted

We need 500 new agents to sell our Pure Pedigree Bred Trees in territory where we are not represented. No experience necessary, but honesty, industry and the ability to stand up straight and tell the truth are very important. Write for terms.

What was written by Esdras near the willow fringed rivers of Babylon,
more than twenty-three centuries ago, still holds good:

*“As for Truth it endureth and is always strong;
it liveth and conquereth, for evermore.”*



Greening's BIG Nurseries

OPERATE SCIENTIFICALLY ON MORE THAN

1,500 ACRES

OF THE BEST LAND

IN AMERICA.

CATALOGUE FREE

We publish the most elaborate and richly illustrated Nursery Catalogue in America. It contains more general information than any other similar publication ever issued. It gives a full description of all varieties and is a complete compendium of useful facts regarding all branches of fruit growing.



AGENTS WANTED

We need 500 new agents to sell our pure pedigree bred fruit trees in territory where we are not represented. No experience necessary, but honesty, industry and the ability to stand up straight and tell the truth is very important. Write for particulars and state the territory you wish to cover.

ITS OUTPUT

THIS YEAR IS OVER

TEN MILLION

PEDIGREE BRED TREES AND PLANTS.

"GREENING'S TREES GROW"